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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,188	02/20/2001	John F.T. Conroy		3777

7590 08/24/2004  
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EXAMINER

NAFF, DAVID M

ART UNIT PAPER NUMBER

1651

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/785,188

Applicant(s)

CONROY ET AL.

Examiner

David M. Naff

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 and 31-39 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 and 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-26, 28, 29 and 31-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

A supplemental response of 5/28/04 and was in response to a Notice of Informal or Non-Responsive Amendment of 4/15//04. The amendment of 4/15/04 amended claim 31 and added new claims 37-39.

5        Claims 1-14 and 27 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 10 filed 7/26/02.

10        Claims examined on the merits are 15-26, 28, 29 and 31-39.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

15        Claims 26, 28, 29 and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uo et al (AL) in view of Hino et al (4,148,689).

~~Claim 26 is drawn to mixing a vegetative cell into a sol, mixing~~  
a dispersant into the sol to cause macropores in a gel formed by the sol and gelling the sol. Claim 28 requires gel containing a  
20        macroporous solid network formed by condensing hydroxy metallates from a sol solution containing a bacterial cell. Claims 29 and 31-36 are drawn to the same type of gel as claim 28 except that the cell is a vegetative cell.

25        Uo et al disclose immobilization of yeast cells in a porous silica carrier with the sol-gel process by forming a mixture

containing tetramethoxysilane (TMOS), water, and PEG, hydrolyzing to form a sol, adding yeast spores, and forming a gel. See paragraph 2.3 on page 427. The porous gel can have pore diameters ranging from 0.1  $\mu$ m to 10  $\mu$ m which are macropores (page 429, paragraph 4).

5 Hino et al disclose hydrolyzing an alkoxysilane to form a sol, adding such as bacterial cells or yeast cells (col 7, lines 1-47) and gelling the sol to obtain a gel with the cells immobilized therein.

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It would have been obvious to use bacterial cells in place of the yeast spores of Uo et al when the function of bacterial cells is desired as suggested by Hino et al producing a gel by a method similar to that of Uo et al and using bacterial cells. To use the bacterial  
5 cells in the vegetative state would have been obvious since this is the state the cells normally are present. The resultant gel would have inherently transmitted light as required by claims 31-35.

***Response to Arguments***

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Applicants urge that Uo et al require yeast spores rather than vegetative cells because an organic solvent that may be toxic to vegetative cells is being used. However, the present claims do not exclude an organic solvent, and do not exclude the harmful affect of an organic solvent on the cells. The present specification discloses having an organic solvent in the sol (paragraph bridging pages 4 and 5), and the claims require nothing to avoid the toxicity of the organic solvent. If one ignores toxicity of the solvent on vegetative cells, the use of vegetative cells in combination with the solvent is obvious. Furthermore, Hino et al suggest that the organic solvent can be omitted by forming a sol and gel therefrom substantially as Uo et al without using an organic solvent. Knowing that an organic solvent is toxic to vegetative cells as disclosed by Uo et al, one will obviously omit the solvent as in Hino et al when vegetative cells are used. Even if the pores of Hino et al are not macropores, it has not been established that obtaining macropores in Uo et al depends on whether or not an organic solvent is present. Moreover, it appears Hino et al obtain macropores due to addition of a polymer such as polyethylene glycol (col 4, line 62) functioning as a dispersant to form macropores as described in the present specification (paragraph bridging pages 4 and 5, page 8, lines 10-11, and page 9, lines 13-19). The cells of Hino et al are entrapped in the gel (col 6, lines 55-60). When used to act on a substrate such as in a column as disclosed by Hino et al (col 9, lines 59-68), the substrate must pass into the gel. Effective conversion of a substrate continuously passing through a column

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containing the gel will require the gel to contain macropores so the substrate can enter the gel and be converted by the cells. The gel produced by Uo et al also contains macropores since polyethylene glycol is added to the sol.

5 Applicants urge that the claims need not exclude an organic solvent. However, if not excluded, the claims encompass the use of an organic solvent. The present specification discloses the use of an organic solvent, and discloses no way of avoiding its harmful toxicity. In any event, it is clear from Hino et al that the organic solvent can  
10 be omitted.

In regard to claim 28, applicants urge that neither Uo et al or Hino et al describe or suggest a bacterial spore immobilized in a macroporous solid network. However, it would have been obvious to use a bacterial spore in Uo et al when the function of a bacterial cell is  
15 desired as disclosed by Hino et al since the sol and gel forming methods of Uo et al and Hino et al are very similar. Since Uo et al disclose that an organic solvent used is toxic to yeast cells not in spore form, it would have been obvious to use a bacterial spore when bacteria rather than yeast is being entrapped in the gel. In addition,  
20 claim 28 does not exclude an organic solvent that applicants urge is required by Uo et al and is toxic to cells not in spore form.

***Claim Rejections - 35 USC § 103***

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Claims 15-23, 25 and 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 26, 28, 29 and 31-36 above, and further in view of Klein et al (EJ) and Rao et al (AR).

5 The claims require a sol containing a P moles of hydroxy metallate, W moles of water, dispersant to cause macropores in a gel formed from the sol and a biological material, and a ratio of W:P greater than 25:1.

10 Klein et al disclose the effect of water on hydrolysis of TEOS and Rao et al disclose the influence ratios of precursor, catalyst, solvent and water on properties of silica aerogels.

15 It would have been a matter of obvious choice and require only limited routine experimentation to select a preferred optimum amount of water in Uo et al in view of the disclosures of Klein et al and Rao et al as to the effect of varying the water content.

#### ***Response to Arguments***

Applicants urge that Klein et al require excess ethanol to permit solubility of the additional water. However, the present specification discloses that an organic solvent can be present, and claim 15  
20 encompasses the amount of ethanol used by Klein et al. It would have been obvious to use in Uo et al the higher amount of water disclosed by Klein et al to obtain the results of a higher amount of water taught by Klein et al.

25 Applicants urge that it is unclear why the properties disclosed by Klein et al resulting from the water content used would be desirable in

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the claimed invention. However, an increased rate of hydrolysis from a higher amount of water taught by Klein et al would have obviously been advantageous to produce the sol of Uo et al and of claim 15 to shorten the time required for hydrolysis. The biological material of claim 15 can be a spore, and Uo et al disclose that using a spore avoids the toxicity of an organic solvent that can be present in claim 15 as described in the specification. When the references are considered together as a whole, the invention of claim 15 and claims dependent thereon is clearly *prima facie* obvious.

***Claim Rejections - 35 USC § 103***

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15-23 and 25 above, and further in view of Schmidt et al (AV).

The claim requires an organic solvent to be produced as a by-product of hydrolysis.

Schmidt et al disclose that hydrolysis of alkoxysilanes produces an alcohol.

It would have been obvious that hydrolysis in Uo et al will produce an alcohol as taught by Schmidt et al.

***Response to Arguments***

No arguments were presented traversing the rejection over Schmidt et al.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Naff whose telephone number is 571-272-0920. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David M. Naff  
Primary Examiner  
Art Unit 1651

DMN 8/23/04